

hundredths more than in December, 1872 and 1890. Owing to the difficulty of measuring snowfall with the requisite accuracy, we may, in general, say that the Decembers of 1872, 1881, 1890, 1896, and 1898 must have been very much alike as regards the dearth of snow.

WYOMING.

Mr. W. S. Palmer finds that, as in most other States, Wyoming has had lower temperatures than the average, but not a remarkably low precipitation. If we arrange the data given by him, according to temperatures, we have the following December values:

Year.	Temperature.	Precipitation.
	°	Inch.
1896	32	0.10
1893	28	0.90
1891	26	0.82
1894	24	0.57
1895	23	0.45
1892	21	0.99
1897	20	0.91
1898	17	0.64
Average.	27.5 20.2	0.60 0.75

This table shows a slight tendency toward an increase of precipitation in proportion as the temperature is lower. The small rate 0.02 for each degree of temperature is, however, affected by a large range of uncertainty, but we are probably justified in considering Wyoming as belonging to the eastern boundary of the region that extends eastward from the Pacific coast and over which low temperatures and increased rainfalls go together. To the east of this boundary we undoubtedly come upon the lower plains where in the winter season low temperatures and diminished precipitation naturally go together.

ASTRONOMY FOR THE METEOROLOGIST.

Under date of December 19, Mr. George Ling, observer, Weather Bureau, at Havre, Mont., writes:

An observer astronomically inclined is compensated for his early rising at this season by the sublime spectacle afforded by the heavens.

The brilliancy of the planet Venus is supreme and presents a grand sight. This morning at 8:10 a. m. (seventy-fifth meridian time) Venus appeared in the southeast unusually large and bright, the reflection of her light from some ks. clouds passing by resembled that of the moon coming from behind a cloud, and soon afterwards a faint corona showed around the planet. I could see Venus after the sun was up, and it was easily seen by the naked eye when the sun was three degrees high.

Farther in the west was Jupiter, in Virgo, shining conspicuously, and still farther west was Mars, in Cancer, looming up bright and red. Each planet shone very large and bright in comparison with the stars. Orion was setting in the west, and his first-magnitude star, Betelgeuze, stood out prominent in the western sky. Castor, of the Twins; Cancer, with its Beehive, and now decorated by Mars; Regulus, in the Sickle; the triangle formed by Arcturus, Denebola, and Spica; Capella and the Kids; the Dipper, with its "pointers" showing the way to the north Polar Star, all added to the splendor of the scene. Here and there a shooting star flashed in sight, but soon all was obliterated as the circle of illumination rose higher and higher.

Mr. Ling's beautiful description of the starry skies encourages us to hope that he will prepare for the careful observation of the meteoric showers, that interest both astronomers and meteorologists; and why may not others do so, also?

ELECTRICAL DISTRICTS.

Referring to the MONTHLY WEATHER REVIEW for August, 1897, page 352, the Editor has been informed that the town of Sparta, White County, Tennessee, is especially subject to

thunderstorms and injurious lightning, which is popularly supposed to be the result of peculiarities in its location. It is situated on the east side of a small stream and on a bluff or hill, considerably higher than the land on the western side of the stream. It is said that the strong winds bringing thunderstorms from the west strike the city on the bluff with great force, that the thunderstorms themselves are much more severe than over the lowlands opposite, and that the danger from injurious lightning is much greater.

No statistics are at hand to confirm this popular belief, but if any exist we should be glad to publish them. On general principles, however, the Editor inclines to the opinion that the popular belief may very likely prove to have but little foundation in fact. Doubtless there are facts that argue both for and against it.

ORIGIN OF THE WORD "BLIZZARD."

According to an article in the Weekly Record, published at Sturgis, South Dakota, January 6, 1899, the word "blizzard" was in use at least as early as 1867. In that year the Hutchinson County Herald gives an account of the blizzard that suddenly approached the town of Vermilion, calling it by that name as one in common use when applied to a sudden change from warm and balmy weather to a blinding snow with cold northwest winds.

The old settlers of South Dakota take exception to the statement that the word "blizzard" originated with a Chicago newspaper, The Advance, on the 8th of January, 1880.

SEISMIC NOISES.

In a letter received long since from Mr. John H. Eadie of Bayonne, N. J., he offered an ingenious explanation as to the origin of the seismic noises frequently heard without any appreciable earthquake shock, viz, that their origin is similar to that of the noises heard in steam-heating apparatus. As is well known, these are caused by the concussion between two masses of water coming together with considerable speed in a space that is almost entirely vacuous. The steam that should fill the pipes is easily condensed if the pipes are cold and the fall of even a drop of water through a vacuous space of ten or fifteen feet, or the rush of water from opposite directions into a space in which steam has just been condensed produces loud noises that would not be made if there were enough air in the pipe to act as a buffer. But it does not seem likely that this explanation could apply to the action of steam in the internal crevices and caves of the interior of the earth, as is suggested by Mr. Eadie, because the surfaces of these cavities can hardly be cold enough to condense the aqueous vapor to the extent necessary to cause the observed phenomena. Neither would the sudden release of gas under pressure escaping into a subterranean passage act like a water hammer unless the passage were appreciably free from air, and this seems rather unlikely.

On the whole we are inclined to adhere to our general conclusions that these subterranean noises originate in the breaking, crunching, and sliding of layers of rock and earth under great pressure.

MIROBIA AND SEICHES.

Mr. F. Napier Denison has made a special study of the minute undulations recorded upon the self-registering tide gauges, and has compared them with the curves of the self-registering barographs for a number of points on the Atlantic coast of Canada and within the Gulf of St. Lawrence and the smaller bays. He finds that these minute undula-

tions in the water are due to the direct action of atmospheric waves or billows, or more properly speaking, oscillations of barometric pressure passing over the harbors and bays. To the Editor it seems that it would be much better to study the barometric oscillations directly as a meteorological problem, and, subsequently, to study their effect on the tides as an oceanic problem; but Mr. Denison finds reason to reverse the order of treatment. His results are of interest to those studying the oscillations of lakes and bays even if they are not so important to the meteorologist, and many readers of the MONTHLY WEATHER REVIEW will be interested in the following quotations from Mr. Denison's paper in the Proceedings of the Canadian Institute for November, 1898:

In 1838 this phenomenon was observed at Swansea, England, where a regular time interval of from fifteen to twenty minutes was noted. Some of these records were sent to Sir George Airy, who was then unable to account for them. Admiral Smythe referred to this phenomenon at Malta, where it had long been termed "mirobia," and supposed to be due to distant storms. In 1878, Sir George Airy read a paper before the Royal Society upon the tides of Malta, in which he speaks of these undulations as simple harmonic curves, whose heads are sometimes notched as by the intermixture of small waves. That they had a time interval of twenty-one minutes and a range of 12 inches amplitude, much exceeding that of the lunar tides. He believed that they were "seiches" similar to those discovered by Forel upon the Swiss lakes, and supposed them due to a reflexive action from the shores of Sicily and the African coast. Major Baird of the Indian Tidal Survey, referred to this phenomenon in 1868 as being most pronounced at the ends of bays, but offered no explanation. In 1896, Professor Duff, of Purdue University, studied these undulations at St. John, N. B., and Indianatown, and later presented a paper before the Royal Society of Canada, in which he also classed them as "seiches," due to some form of oscillation between the two sides of the Bay of Fundy. He does not attempt any explanation for the abnormal movements often observed during fine settled weather. Mr. H. C. Russell, of New South Wales, states that at Sydney what have been previously termed earthquake waves are in most cases due to atmospheric disturbances in some yet ill-defined manner, and have a marked 26-minute time interval from crest to crest.

Finally, these undulations are universal to a greater or less extent, as has been proved by a personal study of tidal records observed from all parts of the world.

CHIEF POINTS DEDUCED.

1. That the undulations are due to the direct action of atmospheric waves upon the surface of the water at stations, and not to ground swells due to distant storms or seiche movements, as found upon lakes during atmospheric disturbances.
2. There is a marked relative correspondence in amplitude between the barometric and water undulations.
3. That they often appear during fine settled weather, when the barometer is high over the station, but decidedly low to the southwest, frequently when over 1,000 miles distant.
4. That they increase in amplitude as the storm advances, the maximum usually occurring shortly before and at the time of the shift of wind, which also corresponds with the time of heaviest precipitation. This tends to prove that the axis of rotation of important storms is inclined toward the direction of its future course.
5. That after the storm has passed the station, these undulations rapidly diminish, although a heavy westerly gale may still be blowing, provided the temperature to the westward is fairly uniform. Should a cold or warm wave be approaching, marked undulations appear.
6. Should a southwest storm move with diminishing energy toward the station, the undulations correspondingly decrease as it approaches.
7. That the tidal records are most disturbed during winter and least in summer, due to the velocity of the primary poleward current being almost double in winter what it is during the summer months.
8. The disturbed traces during the summer months chiefly occur shortly before or at the time of showers or thunderstorms, and usually precede warm and cool waves.
9. Whereas, many of our storms are whirling eddies, developing from above downward, it is hoped a further study of these undulations may throw much light upon their future growth and course, even before the ordinary barometer begins to fall.
10. Meteorologists throughout the scientific world now realize that for the further advancement of weather forecasting, a better knowledge of the upper atmosphere must be obtained. Rapid strides are now being made in this direction by means of kites, balloons, and cloud observations. May we not add the study of atmospheric and water waves at the bottom of this aerial ocean, which can be carried on during all conditions of weather by means of sensitive self-recording instruments that have been fully described in a paper read before the Toronto meeting of the British Association in August, 1897.

BACK NUMBERS OF THE MONTHLY WEATHER REVIEW.

When requests for back numbers of the MONTHLY WEATHER REVIEW are received from those who desire to complete their sets and it appears that the stock on hand in Washington is exhausted, the Editor will mention such cases in the REVIEW, in order that those who are able and willing to supply the desired numbers may have an opportunity to do so. Penalty envelopes will be sent to those who desire to return their copies to the Editor.

No. 13 (Annual Summary, 1892), is desired by Prof. A. Angot, Paris.

The volumes, 1873-1888 are desired by the Secretary of the Canadian Institute at Toronto.

Prof. H. H. Hildebrandsson of Upsala, Sweden, desires the MONTHLY WEATHER REVIEW for the years 1887 to 1891, inclusive.

A NEW ELEMENTARY METEOROLOGY.

An elementary treatise on meteorology has just been published by Alfred Angot, meteorologist to the Central Meteorological Bureau in Paris and professor in meteorology at the National Agronomic Institute, and also at the High School of Navigation. This work is an outcome of Angot's lectures to the students at the two latter institutions rather than a complete treatise on meteorology. It is written for those who desire to become acquainted with the elements of meteorology and is not intended to expound all the facts known at the present time or to discuss critically the theories that have been proposed in order to explain them. Still, no question of any importance has been omitted. The laws of the general phenomena and their theories have been explained in detail but without having recourse to mathematical developments and without assuming that the reader has any but the most elementary knowledge of physics or mechanics.

The preface says:

In a work of this nature it would appear useless to multiply numerical examples, and tables of figures are replaced as far as possible by charts and diagrams. Similarly, we have suppressed the descriptions of instruments and technical details as to the methods of making observations; these questions interest only the observers and professional meteorologists and are to be found fully developed in all collections of meteorological instructions. On the other hand, the author thinks it well to give general indications as to the principles involved in the methods of observation, and the conditions that the observations ought to satisfy, in order to give results worthy of confidence.

Meteorology offers a most varied field of research both in the domain of pure theory and that of its applications; few sciences can be taken up more easily by isolated students and workers who have not at hand the resources of the large laboratories. However, France, which has heretofore played an important part in the development of meteorology, is to-day one of the countries where it is least cultivated; one can assure himself of this fact by looking over the statistics of books published every year in France and foreign countries. This difference is due to the fact that in France there is an entire absence of regular instruction in meteorology and in the physics of the globe. Except in the schools of higher agriculture, meteorology has no place in the curriculum of any of our establishments of higher education; on the contrary, in neighboring countries, including the United States, a large number of special chairs are devoted to it in all the higher schools and in the universities.

These words by Angot must awaken, in every one interested in the subject, a hope that the study of meteorology may be revived in France, and that its importance may become so highly appreciated as to lead to the establishment of courses of instruction in both the lower and higher schools. In America, such instruction is supposed to be an important feature in the ordinary public schools and high schools, so that every citizen may learn to make a wise use of the Daily Weather Map, and a more or less successful, local interpretation of the general forecasts that issue from the Weather Bureau. For this class of students, the beautiful volume by